

PATENT

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ABSTRACT OF THE DISCLOSURE

Methods and apparatus for controlling the critical dimensions and monitoring the phase shift angles of photomasks. Critical dimensions measurement data before wafer processing and after wafer processing are collected by an integrated metrology tool to adjust the process recipe, to determine if the critical dimensions are in specification and to determine if additional etching is required. Phase shift angle and uniformity across substrate measurement after wafer processing are collected by an integrated metrology tool to determine if the phase shift angle and its uniformity are in specification. The real time process recipe adjustment and determination if additional etching is required allow tightening of the process control.

The phase shift angle and uniformity monitoring allows in-line screening of phase shift photomasks.